Comments of Douglas E. Johnson, P.E.
before the
Technical Study Panel on the Utilization of Belt Air
Salt Lake City, UT
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I appreciate the opportunity to present these comments in front of such a distinguished panel. My name is Douglas Johnson and I have worked in various engineering and operations capacities at six of the major underground coal mines in the State of Utah. I have a Bachelor of Science degree from the University of Arizona and I am a Registered Professional Engineer in Utah. In addition to the State of Utah, I hold valid underground mine foreman papers in Ohio, Illinois and Wyoming, and I presently serve as the chairman of the Utah Board of Oil, Gas and Mining.

I began working in Utah as a mining engineer at the SUFCO Mine in 1978 after working as an engineer and production foreman at mines in Ohio and Illinois. In 1980 I transferred to the Skyline Mine where I had various engineering and operations positions through the year 2003 including ten years as General Mine Superintendent. At the beginning of 2004 I went to work for Energy West Mining Company with responsibilities at Deer Creek Mine which included both the Engineering and Safety Departments.

Since early in 2007 I have worked as Director of Corporate Services for UtahAmerican Energy which operates the Aberdeen, West Ridge and Crandall Canyon Mines. Aberdeen and West Ridge both presently operate longwalls utilizing two-entry gateroad development and belt air at the face. The Crandall Canyon Mine did the same until late in 2006, but presently operates only a continuous miner section.

At the present time there are five mines in Utah which operate longwalls utilizing two-entry gateroads and directing belt air to the longwall face. I have worked in management positions at four of those five mines: Skyline, Deer Creek, West Ridge and Aberdeen. All four these mines operate much more safely from a ground control standpoint, in my opinion, because of two-entry gateroads. I have not worked at the fifth mine, Dugout Canyon, but based on my experience while working at Dugout's sister mine, Skyline, it also operates much more safely because of two-entry gateroads.

I am also very familiar with the work of Dr. Maleki and Agapito Associates and thank them for their comments offered to the panel previously. I agree with them completely that, for Aberdeen, West Ridge, Skyline and Deer Creek, mining with more than two gateroad entries would result in a diminution of miners' safety.

That being said regarding ground control, I would now like to direct my comments to the ventilation aspects of two-entry gateroads and the use of belt air at the face. At all the operations with which I am familiar, the health and safety of the miners is improved by the use of belt air. Because of the sophistication and reliability of the AMS systems in use at each of these mines, directing air in the belt entry away from the face and dumping it into the return at the belt drive would be a waste of an available resource that is presently used to make the environment safer and healthier for the miners.

The mines in Utah have shown over the past two decades that use of sophisticated and reliable AMS systems allow the safe use of belt air and significantly improve the atmosphere at the face for the miners by diluting both methane and respirable dust. It's a simple inverse relationship – doubling the quantity of air coursing through an area cuts the methane and respirable dust concentrations in half.

Wendell Christensen presented comments regarding today's AMS systems and, given the performance of these systems, it would be imprudent for this panel to do anything which discourages their use in our mines. The use of belt air carries with it the requirement to use CO sensors rather than the more common, but far less reliable, point-type heat sensors. I offer to you my opinion that a mine approved to use belt air, along with the accompanying requirements including state of the art AMS systems with CO sensors, provides a safer and healthier environment for workers than a similar mine which does not use belt air but does use point-type sensors.

Mines in Utah have significant requirements placed on them in order to receive approval of their two-entry Petitions for Modification. By now I am sure that the panel knows the requirements placed on mines in order to use belt air, but I would like to just touch on some of the practical issues involved with these requirements.

All Utah mines use diesel equipment to transport men and materials underground. Before entering the two-entry section, the diesel equipment operator must call the mine monitor, or dispatcher, and get permission to enter. The mine monitor person keeps track of what equipment is operating in the two-entries and knows the quantity of air required for each piece of diesel equipment in the mine.

The monitor also keeps track of what equipment has entered the section and then parked or been idled. If too many pieces of diesel equipment are operating, the mine monitor will not give you permission to enter the section.

Likewise, if you are at the section and want to leave, you must call to get permission before starting your diesel engine after it has been idled. Many times I have been told to wait until a certain piece of equipment arrives at the section and is idled before I could start my engine to leave.

I am not complaining about the level of additional requirements in a two-entry system, I am just trying to point out to the panel that the petition places many restrictions on two-entries that ultimately make for a safer overall environment.

The visible and audible alarms required where they can alert face personnel, the additional two-way communication system and additional SCSR's required at the longwall headgate and tailgate are among the requirements imposed by two-entry petitions that, in my opinion, make two-entry longwalls using belt air safer overall than longwalls without belt air.

As Laine Adair went through in his presentation, our ventilation engineer at UtahAmerican, a P.E. by the name of David Canning, ran some simple models using VnetPC to illustrate the additional air that is available at the longwall face by using belt air rather than by directing it to the return at the head of the section. I know that Laine has gone through this previously, and in

fact Link Derrick presented very similar figures yesterday representing the Colorado Mining Association, but having increased air available for use at the face is very important to the health and safety of the workers, so I am going to present it one more time. Using actual leakage and resistance values measured at West Ridge and Aberdeen, Mr. Canning showed that on a typical 9,000-foot longwall panel, with 1.6 inches of water gauge ventilating pressure differential, and with Kennedy stoppings on 120-foot centers, 140,000 cubic feet per minute of air would be available at the longwall face. Using the same parameters, but directing the air out the beltline, starting with 1,000 CFM at the last open crosscut moving outby, only 98,000 cubic feet per minute of air would be available to the longwall face. This is an increase of 42,000 CFM, or about 43% by using belt air – a significant difference in the air available to dilute and render harmless methane and respirable dust by anyone's standards.

Another important point that Mr. Canning demonstrated with his model is that the "diagonal pressure" – the differential ventilating pressure from the headgate end of the longwall face to the tap point at the back end of the panel where air leaves the gob to enter the bleeder entry – is increased by using belt air. The available pressure at the headgate is doubled with belt air. This is a clear-cut factor in improving the performance of the gob and bleeder ventilation system.

It could be said by some that all a mine would need to do to make a safer and healthier environment, is to increase the amount of air being directed to the working face. But the fact is that the mine ventilation system is a finite resource. Adding air to one portion of the mine must be accomplished by taking air away from a different portion. That is precisely why we prefer using belt air at the face rather than directing it down the beltline into the return.

It could also be said that instead of taking the air from another section, the mine could install a more powerful fan to make a safer and healthier environment. But increasing the overall ventilating pressure causes other problems such as increased leakage and increased pressure against mandoors which both decrease the safety of the miners underground. As an example, the total net ventilating pressure at the Aberdeen Mine is approaching 19 inches water gauge. At the mine's elevation of over 7,000 feet this converts to 24 inches of water gauge at sea level – which is near the design limit for vane axial fans.

At mines in the eastern U.S., a common practice is to decrease mine-wide resistance by driving, or boring, holes to the surface on a regular basis. In western U.S. mines that is often not an option due to the increased overburden and adverse terrain.

It could also be suggested that additional entries could be driven in the mains in order to decrease the overall mine resistance. At Skyline we mined at depths of up to 2,200 feet, and at Deer Creek over 2,600 feet. At West Ridge we have mined at more than 2,800 feet deep and Aberdeen has developed mains at over 3,000 feet deep. At these kinds of depths, longwall gate roads are not the only entries that pose ground control problems.

At UtahAmerican, because of extensive ground control modeling, verified by in-mine measurements, we routinely drop from seven-entry mains to five entries and widen the pillars when mains go beyond 1,500 feet of overburden. When the mains go beyond 2,000 feet of overburden, the pillars need to be widened again.

With the depths at which we mine in Utah, developing too many entries in the mains is likely to create a squeeze condition and ground control problems. By driving too many entries in the mains, a mine can actually hurt its ventilating ability because of decreased cross-sectional area caused by squeezes, falls that may block off entries, or because of roof support cans or wooden cribs set in an effort to hold the entries open.

At the mines I have worked at in Utah, we have also had to cross faults with as much as 45 feet of displacement and cross igneous dikes that were more than 200 feet wide. With the amount of drilling and shooting that is required, in many cases it is not practical to develop more than three entries to cross these geologic features. Indeed, at all the mines I have worked at in Utah, drill jumbos have been proud parts of the equipment fleets.

In summary, I would hope the panel leaves Utah with a good understanding of the unique problems that have been faced, and overcome, by mines in the west. The following five points are the crux of what the panel has seen and heard over the past three days:

First, two-entry development has proven itself over more than 50 years as a successful way to mine the deep reserves in Utah.

Second, using belt air is an important component of two-entry mining.

Third, modern AMS systems are reliable, dependable and comprehensive.

Fourth, the existing belt air rules offer a safe and healthy environment for the workers, if the rules are followed.

And finally, the use of belt air, if systems are properly maintained and operated, offer benefits, not hazards, in the event of a fire.